User Manual

MARATHON 200LT

GS vitec

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Instructions

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marathon 200 LT in zero gravity 52

Important information

- You must read through this manual carefully before starting the system.
- All persons who work with the system must heed this manual, particularly the safety instructions.
- It is essential to heed the accident prevention rules and regulations applicable to the place of use.
- Use the system only in accordance with the manual.
- Modifications or repairs must be carried out only by persons authorised by gsvitec GmbH.
- It is not permitted to modify or convert the system. gsvitec GmbH is not liable for damage resulting from that.
- The latest manuals and documentations apply. The technical data specified by us have been measured by our methods and equipment; properties are guaranteed only under these conditions. It is the user‘s responsibility to test and determine suitability for intended use, i.e. use under conditions of use. gsvitec GmbH accepts no liability for this.
- Each time you update your data, make backup copies on an external storage medium (e.g., external hard disk). We do not accept any damage compensation claims for loss of data or any consequential damage.

Safety instructions

- Check that the main voltage matches the specifications of your system.
- To disconnect the system from the power supply, it is not sufficient just to switch it off. It is essential to cut off the power supply by pulling out the mains plug.
- Do not put anything inside the system through the slots and holes. This could result in a short circuit or even in fire.
- If the user does not comply with the safety regulations, gsvitec GmbH is absolved from accident liability.

CE-marking

This system complies with the requirements of the EMV directive and safety standard EN 60950.

Transport

Transport the system only in its original packaging or in other packaging which provides sufficient protection against bumps, knocks and damp.
While transporting the system, it is essential to heed the following:

- In the case of major variations in temperature and moisture, condensation can produce dampness inside the system, resulting in a short circuit. After transporting the system, wait until it has adjusted to the ambient temperature before starting it.

Cleaning

- Switch off the system and pull out the mains plug.
- Clean the casing with a dry cloth or with a damp cloth, if it is dirty.
- For cleaning the casing, do not use scouring powder or any cleaning agents which dissolve plastic.
- Take care to ensure that no liquid penetrates the casing.
- The inside may be cleaned only by trained personnel.

Disposal and recycling

- Observe the currently applicable regulations governing proper disposal. Batteries do not belong with household refuse. They are taken back free of charge by the manufacturer, dealer or his representative.
- The EU Battery Directive obliges end-users of batteries which are refused to return them to the distributor or to official local authority recycling distribution points.

1 Introduction

First steps with your marathon 200 LT

Welcome!

We wish you much success and enjoyment in using your marathon 200 LT high-speed system.

To allow you to work efficiently and successfully, a great amount of importance has been attached to easy, intuitive operation, in the development of the marathon 200 L T high-speed system. We have followed the same approach in producing our manual, with the result that we have achieved a clear format intended to support you during start-up and in working daily with the system.

The manual's structure

The manual is divided into five parts: short introduction, hardware description, operating software, troubleshooting and service.

Basic requirement

Basic knowlegde

Our marathon 200 LT high-speed system has been designed in such a way that it can be used without previous expensive training sessions or tedious introduction phases, if you have a basic knowledge of optics. The software interface, in particular, has been clearly laid out and designed for touchscreen operation. Since, however, an optic device is used, in a high-speed system, a basic knowledge of photography and optics are of great help towards success in your work. There is a large amount of photographic literature available, to which we would

like to refer here, as we are only able to deal with basic features in our manual.
We would also like to point out that we provide training courses which deal generally with the basics of fibre-optics, lighting and high-speed system techniques, in intensive lectures and workshops. If this should interest you, you are welcome to get in touch with us. You will find our contact details at the back of the manual.

Training

Features of the marathon 200 LT

marathon 200 LT: High speed camera long time recorder (Figure with touch-screen)

In developing the marathon 200 LT, our objective was to break through the boundaries of conventional high-speed systems. Conventional high-speed systems with integrated memory (RAM) are very limited in terms of their maximal recording time. As a general rule, it is only a few seconds. A further disadvantage is that this memory must be transferred to a PC or laptop for connection to the external input socket, which results in a considerable period of system downtime.

Limitation of conventional high-speed cameras.

Depending on the equipment, this can last up to half an hour. In daily use, during manufacture on the production machines or in the laboratory, it is often really difficult to capture tricky shots with these short recording times. Complex triggering is frequently necessary to record sporadic events in a reliable way. As a general rule, conventional high-speed systems also present problems with regard to lighting requirements, as the light-sensitivity of the sensors is usually not very high.

Very long recordng time

The marathon 200 LT high-speed camera system adopts another approach. With the marathon 200 LT, the data are not backed up to a memory in the camera but are saved directly in real-time in an external digital recorder. This makes possible a recording time of up to two hours at full frame rate. By backing up the data immediately, you avoid system down-time. After one recording you can begin the next immediately. Especially for troubleshooting and optimisation processes on complex machines, a camera which can be reused very quickly is a big advantage when it comes to efficient use of work time. The marathon 200 LT also offers the ring memory operating mode, which lets it operate the system 24/7. With this operating mode, the last 1½ hours always remain in memory. You can install and set up the camera in a machine, with the result that, even if an event occurs only once during the week, it is properly recorded. A large number of possible settings of the intelligent integrated trigger function expands the range of use further.

24/7 ring memory operating mode

The marathon 200 LT can be operated with a colour or black-and-white camera head, depending on the application. The used CCD-chips in both camera heads are extremely light sensitve, meaning that it is even possible to dispense additional lighting in many cases. This applies particularly to the black and white head, which is 2-3 times more light sensitive than the colour version.

By using a very small camera head, it is possible to use the camera even in parts of a machine which are difficult to reach.

Extremly light sensitive and small camera heads

The camera head can be connected to the recorder via Gbit Ethernet or glass optical fibre (GOF). Particularly over longer distances, the glass-fibre connection offers advantages because of its almost unlimited cable length. The whole system is compactly designed and in conjunction with the exceptionally strong moulded carrying case it is very useful for the service department. An optional battery-driven mobile version is also available. In that case, the maximum running time is about two hours.

Optional with glass fibre connection (GOF).

Mobile solution and transport with optional hard-top case

2 The Equipment Hard-ware

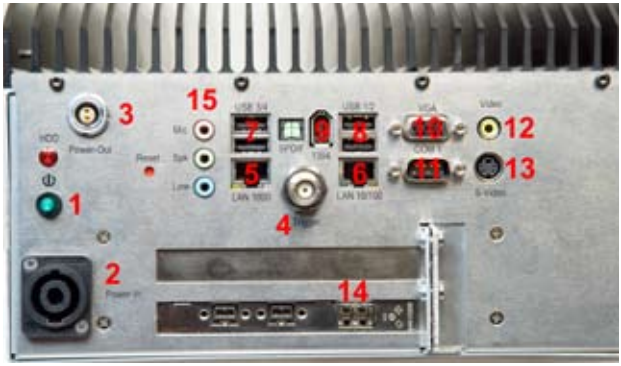
The marathon 200 LT high speed camera system consists of a digital recorder, a camera head that is connected to a GBit-Ethernet or a glass fibre, and an optional TFT touch screen (see Figure on P. 5). We would now like to describe the component parts in detail.

Interfaces of the Digital Recorder

View of the marathon 200 LT Digital Recorder

The recorder is based on industrial computer (IPC) standards and supplies the common interfaces. The recorder device is powered by an external 12 Volt power supply pack with the necessary direct current voltage. Please use the included power supply pack only, since otherwise the device may become damaged.

Interfaces:
- Audio 5.1
- 4 x USB 2.0
- 1 x RS-232
- 1 x FireWire-1394a
- 1 x 10/100 LAN
- 1 x Gigabit LAN



Connectors of the marathon 200 LT Recorder, front side

1. Master switch (button)
2. Electricity supply for power supply pack
3. Electricity supply touch screen
4. Trigger connection (BNC)
5. GBit-Ethernet connection
6. LAN connection
7. USB connection socket
8. USB connection socket
9. FireWire-1394a
10. Monitor VGA outlet (also for touch screen)
11. Serial interface (COM) for touch screen
12. Video
13. S-Video
14. Glass fibre connection for camera head (optional)
15. Audio connections

marathon 200 LT
Recorder, back side

marathon 200 LT
Recorder, side view

Dimensions
marathon 200 LT Recorder

External Measurements of the Recorder

Without the Fixation Bars:
Width 250 mm
Height 145 mm
Depth 250 mm

Ambient Conditions for the Recorder

Service Conditions:
Operable temperature range: In an environment of 5 - 38°C with specified permanent hard drive 24 hrs./ 7 days.
Change in temperature: max. 10°C / 30 min
Relative atmospheric moisture: 10 - 90 %
Atmospheric pressure: 700 - 1100 hPa
Accumulation of condensation : noncondensing

Storage Conditions
Temperature range:
In an environment of -20 to +60 °C
Relative atmospheric moisture: 0 - 90 %
Atmospheric pressure: 280 - 1100 hPa
Accumulation of condensation: noncondensing.

Interfaces of the Touch screen

Optional TFT-touch screen

1. Connection socket, special Touch screen cable
2. Service Jack

If you purchased the system with the high definition Touch screen (1024 x 768 Pixels), you need to connect it to the recorder using the special cable that came along with the device.

Connecting cable for the optional touch screen

1. Connector for the Touch screen (jack 1 on the monitor
2. Connector for electrical supply (jack 2 on the-marathon 200 LT Recorder)
3. Serial connection (jack 5 on the Recoder)
4. VGA Connector (jack 6 on the Recorder)

marathon 200 LT Recorder with special cable plugged in for the optional touch screen

Attributes and connectors of the Camera Heads

The inserted camera heads in the high speed digital camera long-time recorder marathon 200LT are built very small and have a low aperture. This makes the operation of the device remarkably easier, especially when it is necessary to take pictures in difficult to reach places.

Camera head marathon 200 LT (glass fibre option, GOF)

Technical Specification of the Camera-Head (GOF)

Sensor model/size:
Model 1/3 (Diag 5.92 mm) Progressive Scan KODAK CCD Sensor

Screen size: 640 (H) x 480 (V) Pixels

Size: 7.4 µm x 7.4 µm

Color depth: 14 bit

Lens fitting: C-Mount, CS-Mount

Digital interface:
IEEE 1394b (S800); IIDC V1.31

Shutter speed: max 1/20.000 seconds

Powersupply:
Direct voltage: 8 V – 36 V via IEEE 1394 cable

Power consumption:
Glass fibre option (GOF): 5,75 Watt (@ 12 Vdirect voltage)

Dimensions:
96.8 mm x 44 mm x 44 mm (L x W x H); without tripod and lens

Mass: < 250 g (without lens)

Operating temperature (housing): +5°C ... +50°C

Optimal storage temperature: -10°C ... +60°C

Conformity:
EN55022, EN61000, EN 55024, FCC class B; DIN ISO 9022, RoHS (2002/95/EC)AA

Technical Specifications of the Camera-Head (GBit-Ethernet)

Sensor Model/size:
Model 1/3 (Diag 5.92 mm) Progressive Scan KODAK CCD Sensor

Screen size: 640 (H) x 480 (V)

Pixel size: 7.4 µm x 7.4 µm

Color depth: 12 bit

Lens fitting: C-Mount, CS-Mount

Digital interface:
Gigabit Ethernet (GigE Vision compliant)

Shutter speed: max. 1/10.000 seconds

Power supply:
Direct voltage 12 V – 24 V

Power consumption:
approx. 5.5 Watt (@ 12 V di rect voltage)

Dimensions:
86.7 mm x 44 mm x 29 mm (L x W x H); without tripod and lens

Mass: < 220 g (without lens)

Operating temperature (housing): +5°C ... +50°C:

Optimal storage temperture: -10°C ... +60°C

Conformity: CE, FCC, RoHS, IP30

Terminal area camera head GBit-ethernet model

Connecting the Camera via GBit-Ethernet

Connection using a GBit-ethenet cable.

When you use a GBit-ethernet camera head you can connect it with the RJ-45 GBit-ethernet cable that came with the device or a comparable cable (see P.13). The camera head must be supplied with the necessary direct voltage with an external power supply unit. Please use the supplied power supply unit and none other since otherwise the device may become damaged.

Connecting the Camera via the Glass Fibre (GOF)

Connection using glass fibre cable.

If you have a camera head that is able to be connected using glass fibres, then you can connect the camera when the Recorder is on. First remove the protective cap from the glass fibre cable as well as the protective cap from the glass fibre connector on the camera head and on the recorder. Plug in the glass fibre cable until it is engaged. If the camera head is to be connected using a glass fibre, then the camera has to be supplied with the necessary supply voltage with an external power supply pack. Please use the power supply pack that came with the device and none other, since otherwise damage may occur to the device.

After using the camera it is imperative to put the protective caps back on, or else the cable or the

Terminal area of the camera head model (GOF)

jacks can become contaminated or damaged.

Removing the protective caps from the glass fibre cable

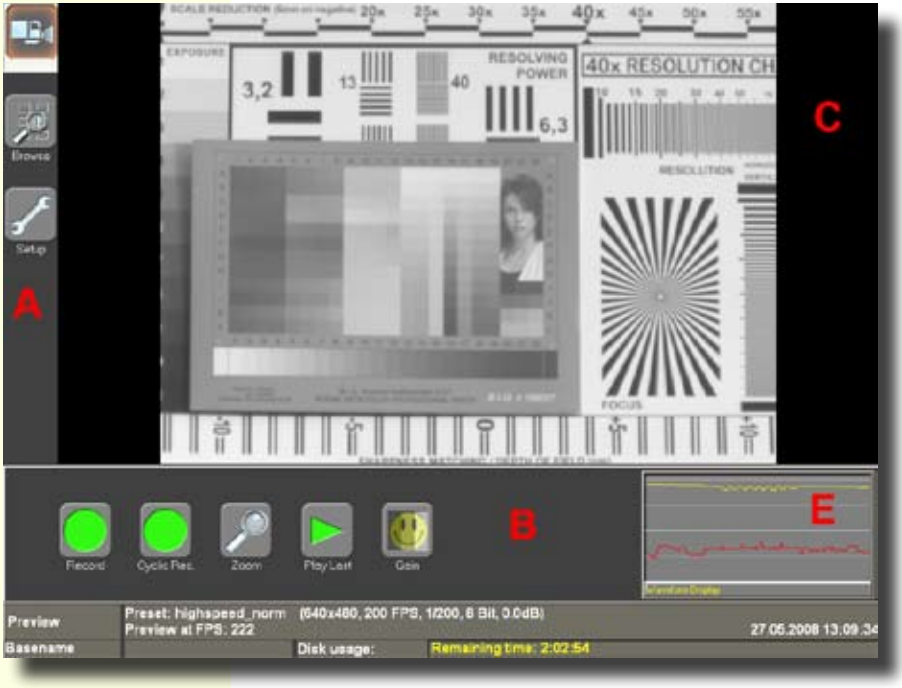
Insertion of the glass fibre cable and the power supply in the camera head

3 The Device Software

After the device is connected, you can start the device. For this, press the on/off button on the recorder. If the recorder is supplied with required voltage, the green light flashes.

Start and activate marathon 200 LT

After a short start phase, the operating software shall be recognised on the connected monitor with the updated live image of the camera.



The Software interface of marathon 200 LT basically has the following four parts (A-E):

- A – Base menu
- B – Context menu and status bar
- C – Camera image (live and playback)
- E – Histogram, waveform, vectorscope

A – Base menu

marathon 200 LT base menu

The base menu is on the left side of the screen and helps to navigate through the sub-menus of the software. Here you can quickly access the major functions of the high speed camera longterm recorder.

Camera

With this button, you will return to the current view – the start screen.
From here, you can manually start, stop and playback recordings.

Browse

With this, you can access the file browser, where all the saved recordings are listed. Here you can also delete recordings or select them for inspection.

Setup

Here you come to the setup submenu, where you can configure the device and the camera parameters.

B – Context menu and status bar

Context menu

Depending on which main menu you are in, the context menu is different according to the superordinate structure. We will go into details of the individual sub-menus later.

Status bar

Furthermore, under the selection buttons, you will find the status bar with the current parameters, such as the loaded preset (configuration), the current recording number, the frame rate set, time and date, as well as the maximum remaining recording time of the recorder.

C – Camera image display area

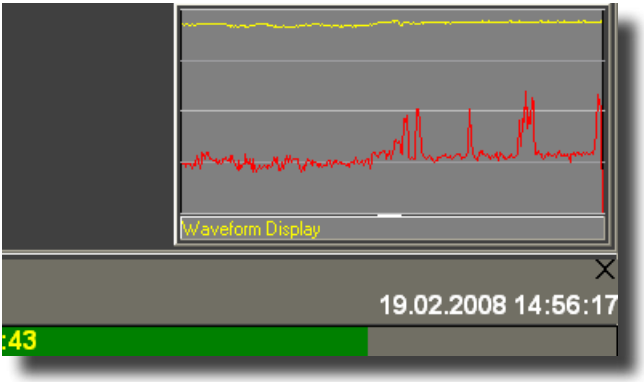
In this area, the live and the playback image of the camera are displayed. Depending on whether you have attached a colour camera or a B/W camera, you will see the current image in colour or monochrome.

Move image

If you have zoomed into the window, you can move the current image detail by pressing your finger on the touchscreen. For a normal monitor, you can do this by pressing the left mouse button.

E – Histogram, waveform, vectorscope

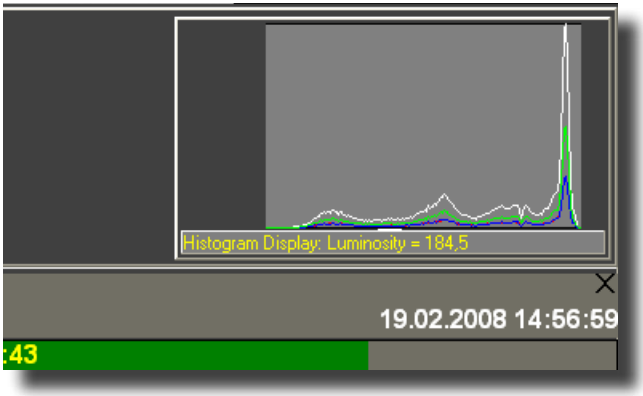
The displays for histogram, waveform and vectorscope are very helpful for evaluating the light exposure of the current camera installation. You can switch between the displays very easily by clicking or by touching.



Waveform display

The waveform display gives you an overview of the current distribution of the minima and maxima of the brightness distribution in each column. For this, the yellow line represents the bright light values and the red line the dark values. Now if you have a very bright basic image and are not sure if the bright areas in the image don't burn out (clip), that is, they are pure white without containing any other information, you can use the lens aperture to darken the image till the line is at approx. 80-90%. If the yellow line is at 100%, the corresponding area is still only white.
The relation between the red line and the dark values is similar. If you wish that the dark areas should contain image information (texture), then this line should not go below 5-10%.

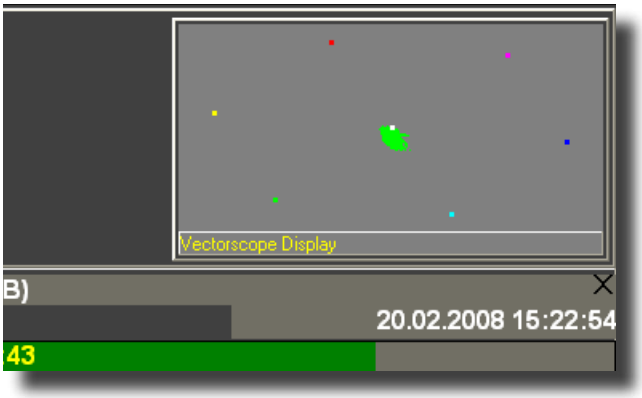
Tool to determine the current exposure values



Histogram display

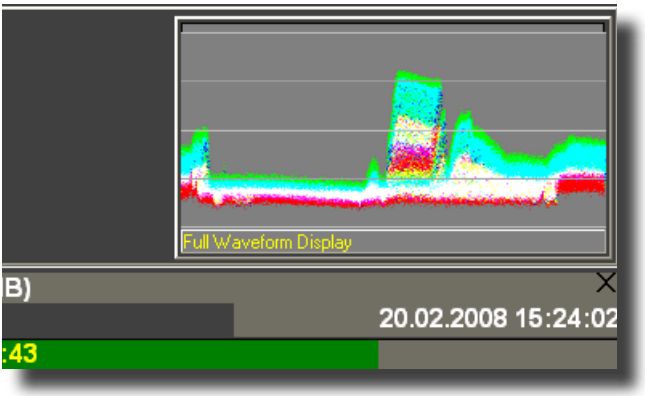
The histogram display should help you to adjust your image optimally. In this display, the brightness values (and/or tonal values) are averaged over the entire image. The histogram should ideally cover the entire area and run off over the borders. If the distribution is concentrated at either one or the other end, statistical losses should be assumed in these fields. On the left side you will find shadows (dark areas in the image) and on the right the highlights (bright areas in the image).

Vectorscope display



If you operate your system with a colour camera, the vectorscope and the full waveform displays help you to present the tonal value distribution in the colour space and a breakdown of the colour spectrum according to colours. This is especially useful if you want to evaluate a colour-indicated process.

By multiple clicks or touches on the current screen, you can switch through the various displays.



Full waveform display

Context menu Camera

In the following, we will have a look about the individual selections possible in the context menu “Camera”.

1. **Record**: With this button, you can manually start a recording. After a short initialisation period, the recorder begins to record the camera data onto the internal storage system. After the start, the context menu changes so that only a stop button is visible. In the status bar, you get to know how much longer you can continue recording until the storage system is full. In the currently active context menu, you can likewise recognise the marker button. You can use this to manually mark particular events in the recording as timestamps. For this, you only need to press the button. With this, it easier to find particular place while viewing the data later.

Starting a recording manually

Marking events manually

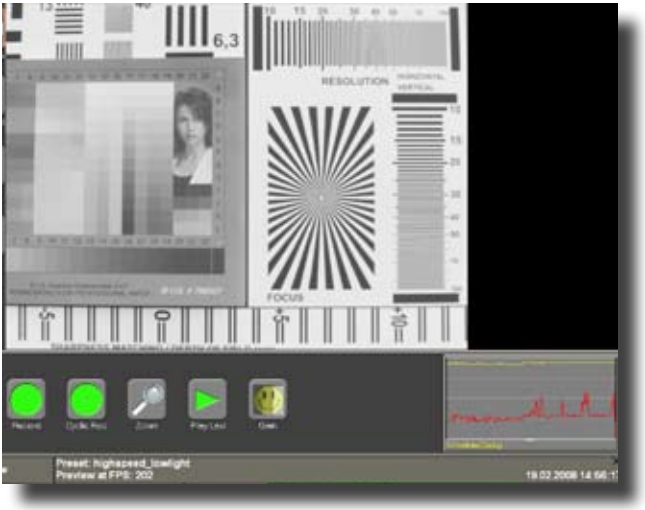
Menu during recording operation

Ring buffer operation

2. **Cyclic Rec.**: With this button, you can start a recording in the ring buffer. In this mode of operation, the camera system can record 24 hours a day, 7 days a week, and always, the last 1.5 hours are saved (in case of an empty storage system). This kind of operation makes sense, if an event only occurs very sporadically cannot otherwise be captured by the trigger. Please note that the maximum storage time is heavily dependent on the utilisation of disc space. If required, please delete recordings to increase disc space. To start this type of operation, disc space availability of at least 30 minutes is required.

Zoomfunction

3. **Zoom**:With this button, you can zoom in the live image of the camera. The image detail is increased by a factor of 2. you can now move the image in the detail with the mouse with a pressed finger. This is especially helpful if the sharpness of the image cannot be judged well.



Live image of the camera without zoom

Live image of the camera with factor 2 zoom

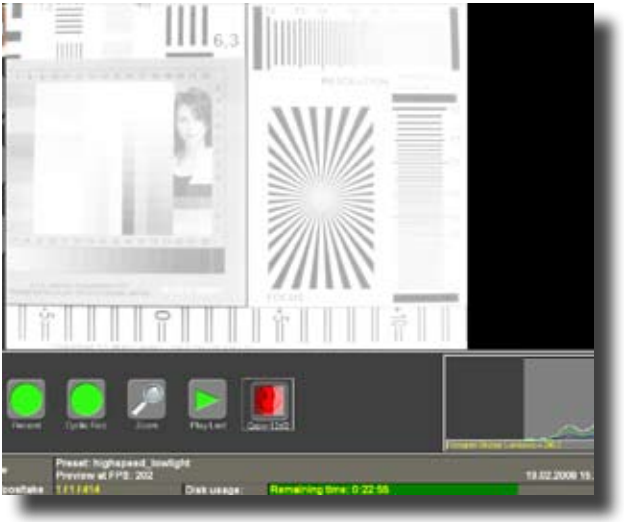
Viewing previous recording

4. **Play Last**: To view the previous recording, press this button.the last recording is loaded in playback mode. Please read the details in the section Playback in this manual.

5. **Gain**: Although the camera heads of the marathon 200 LT series are very light sensitive, it might be necessary in unfavourable conditions to increase the gain of the camera. Due to the good image quality, this button can be used to set the gain from 0dB through 6dB to 12dB without much loss in image quality.

0 dB gain

6 dB gain


6.3
Preset: highspeed_lowlight
Preview at FPS: 202
Disk usage:
Remaining time: 0:22:55

12 dB gain

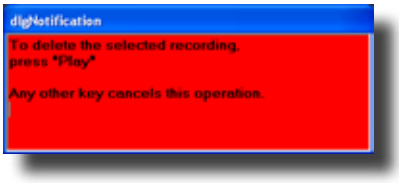
Context menu Browse

Playback of recordings from the browser

When you select the button Browse, you enter the corresponding context menu for selecting and managing existing recordings. All recordings are listed in an overview. You can directly select the recordings using the mouse or a finger or the arrow buttons at the bottom left. The metadata of the selected recording are displayed at the bottom right. If you wish to playback a recording, you can directly select it by a double click or with the arrows

Delete a recording

and the button *Play*. If you want to delete a recording, then as usual, select the desired recording, and then press the *Delete* button. To avoid errors, you have to confirm this select by pressing *Play*.



Batch, batch processing

With the button *Batch* you call the dialogue for batch processing. This batch file is especially helpful if you want to render recordings (create avi files) not immediately but, for example, overnight. You can add selected recordings to the batch processing with the button *To Batch.* The batch processing is started with *Execute*.

Context menu Setup

Calling the setup menu

If you press the Setup button, you will go into the following context menu:

The context menu visible now consists of the following selection buttons:

1. Preset
2. Change
3. Trigger
4. ROI
5. Back

Save and load presets

1. **Preset**: You can save the basic setting of the system in the so-called Preset files. This is helpful if one has made settings in the system for special and repetitive recordings, which can be called quickly and easily later. While deliver the system, two Presets are also delivered, one setting for normal operation (highspeed_ norm), as wel l as one setting for bad lighting conditions (highspeed_lowlight).

Change presets

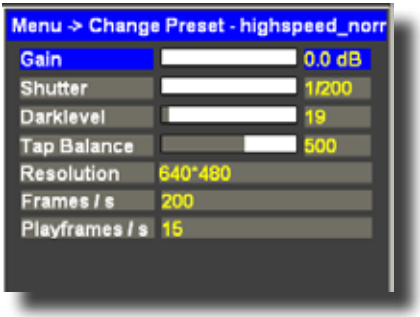
2. **Change**: One can call the dialogue for changing the system settings by selecting this button. This must be called with arrow buttons option for selecting a value. One can increase or decrease the value by clicking the left/right arrows.

Set camera gain with slider

Gain: Similar to the quick key described on P.28 for changing the camera gain, you can also change the gain factor in this dialogue. But this time you have the option to select the value between 0dB and the maximum value of 12dB with the help of a slider. Value as high as 12dB should be used only in special cases, because high level of noise degrades the image quality drastically.

Camera shutter / Exposure-time

Shutter: The exposure time of the camera shall be set with the shutter. The exposure time is the span for which the camera sensor is exposed to light. The smaller the value, the lesser the light that reaches the sensor, the darker the image is. The longest possible exposure time is given

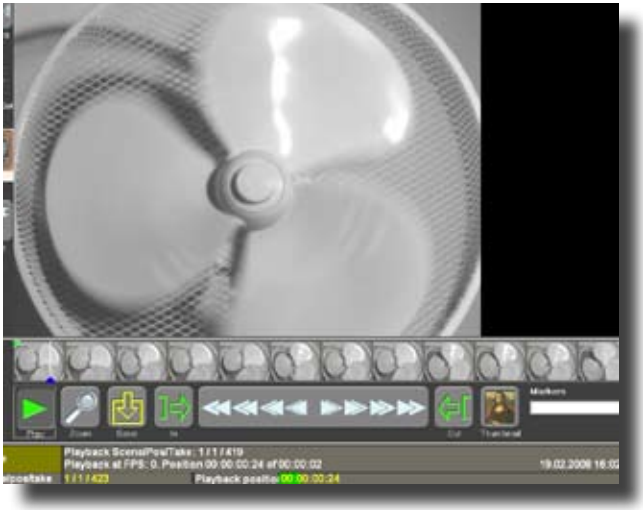


by the image rate of the camera. If the camera is set to 200 images per second, the longest adjustable exposure time is 1/200 second (Full frame-Shutter). It is not always required or meaningful to select a higher image rate if one want to capture fast moving objects and thereby compensate for a trigger delay. Often it is adequate to reduce the exposure time. The faster an object is, the bigger is the path that the object covers during the exposure time. The blurs that appear here shall be termed as motion blur. Example: a steadily moving object with approx. 10 m/s (approx. 36 km/h) shall be covered with an exposure time of 1/200 seconds during this time approx. 50 mm path. The object is displayed blurry in every case depending on the image detail. If you set the exposure time of the camera to 1/5000, the distance covered during the sensor exposure is only 2 mm. The blur reduces considerably and the sequence can be optically assessed even without higher image rate.

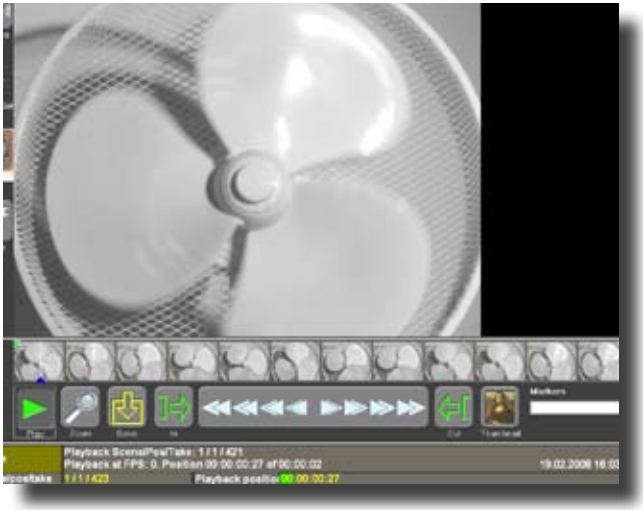
Motion blurs

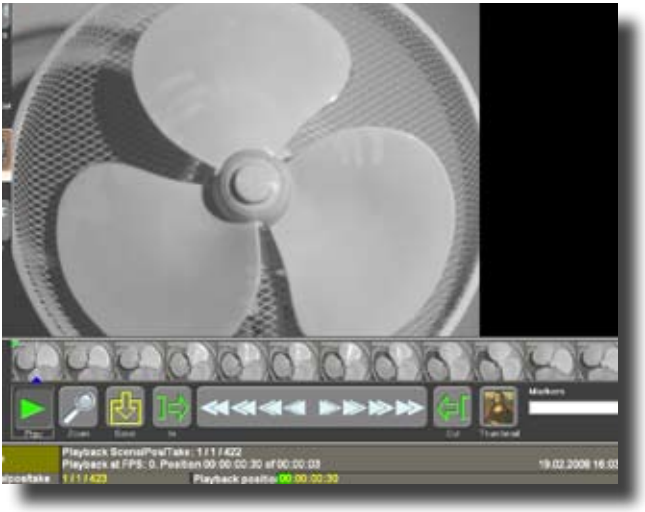
Please note that one light aperture stop is lost when the exposure time is halved. It may also be necessary to compensate this loss of light by increasing illumination. If the entire process is very short or very fast, it may happen that too few images are contained in the recording; in this case the image rate should be increased.

Motion blur: Exposure = 1/600 seconds. The image is blurred.



Motion blur: Exposure time =1/1000 seconds. The image is less blurred, but still not very clearly identifiable.





Motion blur: Exposure time = 1/6000 seconds. The image is very sharp.

Dark-Level: The dark level sets the level of blackness in a darkened image. This should only be performed by experienced users.

Dark-Level

Tap Balance: The sensor of a camera head is made up of two parts, which are captured separately. There is one left and one right sensor area. This may result in a slight difference in brightness, which can be compensated using the tap balance.

Tap Balance

Frames/second: Available image rates (images per second) may be adjusted according to the setting of the camera resolution. With a resolution of640 x 480 pixels this has a maximum value of 200 images per second. If you have a very slow process, however, which possibly does not require such a high image rate, you can also reduce the image rate, e.g., to 100 or 50 images per second. With lower resolutions the image rate can be increased to approximately 570 images per second. This may be relevant for detail examinations, which do not necessarily require a high image resolution.

Image rate / Frames per second

Playback rate / playframes

Playframes/second: You can adjust how fast your photographs are played back here. Basically, the slow-motion effect results from the fact that image data are recorded fast and then played slowly. If a photograph with 200 images per second is played, for example, then a time dilation of a factor of 10 results. A normal reproduction rate for films and television is set at 24/25 images per second for a judderfree image. Reproductions with over 25 fps are not meaningful, since the human eye cannot observe them. The image clearly judders at reproduction rates below 15 fps. Marathon 200 LT systems' playback should thus be set within this range. 15 fps have proved to be meaningful practically.

Save settings: Save and Save As

Save: With this button you can save the current settings.

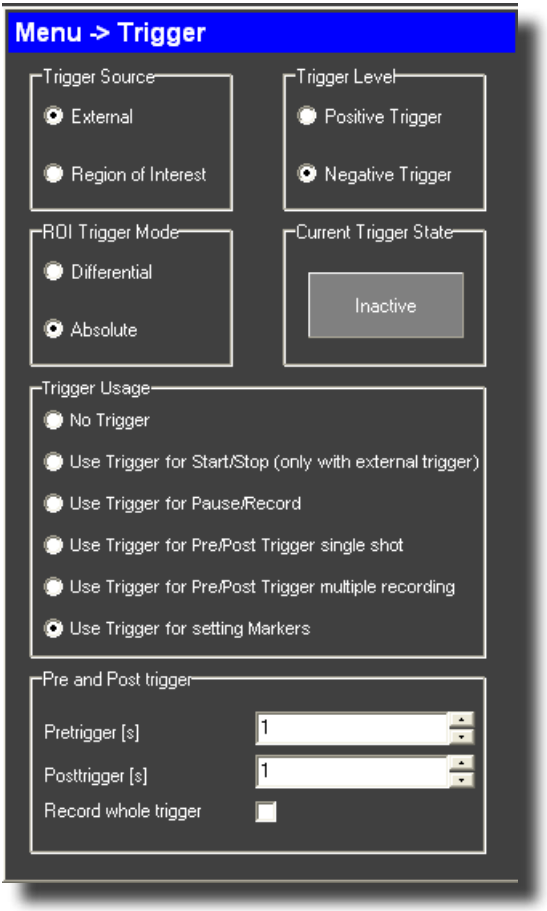
Save As: If you wish to save the settings under another preset value, you could call the corresponding dialogue with this button.

Back button

Back: You will go up one menu level with this button.

3. **Trigger**: Marathon 200 LT offers numerous different trigger possibilities, in order to also allow capturing rare events, which are difficult to capture, reliably and comfortably:

Trigger settings



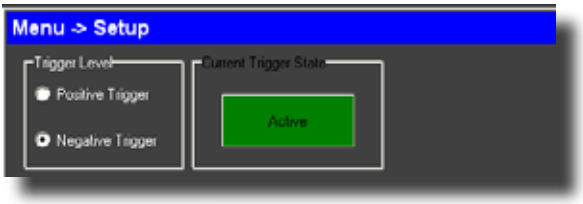
Trigger Source: You can select whether the external trigger input (BNC box) or image trigger (ROI) should be used as trigger source with this setting.

Trigger source

Positive trigger / negative trigger: You can select whether the trigger reacts on the positive or negative side with this setting. You can easily control whether the logic is working and the trigger setting reaches the device, by checking if

Trigger logic

the area “Active” flashes green when the trigger is on.



ROI Trigger Mode

ROI Trigger Mode: If you use the image triggers, you can select whether they should work differentially or absolutely with this setting. Differentially means that a comparison of whether the brightness changes significantly in the defined area (ROI) is made image by image. If you set the ROI Trigger to Absolute, there is a check within the ROI to determine whether the brightness value exceeds a previously set threshold value (also refer to 4. ROI for this purpose).

No Trigger

No Trigger: Adjacent trigger signals are not processed.

Start/Stop Trigger

Use Trigger for Start/Stop: With each trigger signal a recording is stopped or started. For each cycle a separate file is created. Trigger signals that are received during the short down time of the system when it is being switched over, are ignored and remain unprocessed.

Pause/Record Trigger

Use Trigger for Pause/Record: In this mode of operations, only one file is created. If you have started the recording manually, with each incoming trigger signal the position is switched between Pause and Record. Each conversion position is marked with a time marker, to find this quickly during playback later.

Use Trigger for Pre/Post Trigger single shot: If you use this trigger setting, you can define a pretrigger and a post-trigger range, i.e., the camera records for a defined period BEFORE the trigger and for a defined period AFTER the trigger. Thus you can record the period around an interesting event and you can even examine what happened immediately before the event. This is very helpful in analysing break-downs and faults in machines, which make an IO/ NIO signal available, which can be used as a trigger signal. This method allows only one recording, after which no further trigger signal will be processed.

Pre/Post Trigger single shot

Use Trigger for Pre/Post Trigger multiple recording: Similar to the Pre/Post Trigger single shot procedure, you can define run-times prior to and after the event in the recorder. In contrast to the previous operating method, each event is recorded as a single file here, though. The trigger input remains active. Thus, you can record all break-downs occurring during a night shift, for example. Please note that here also those trigger signals which reach the small down time of the systems during the switch-over are ignored and not processed.

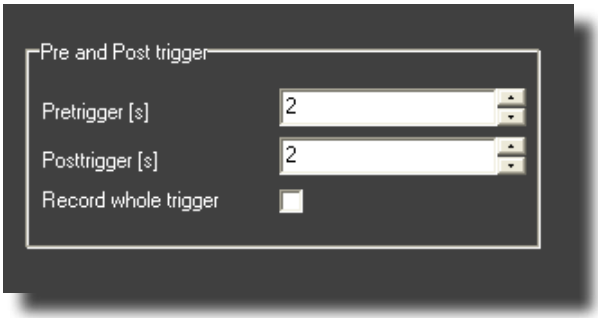
Pre/Post Trigger mutiple recording

Use Trigger for setting Markers: When this function is selected, each incoming trigger signal is marked as a time event. This is particularly helpful if you wish to find definite positions, which are informed to the system via the trigger, quickly at a later time in the recording.

Setting time markings using trigger signals

Pre- and Posttrigger: In this field you can specify the desired time in seconds for the pre-triggers and post-triggers.

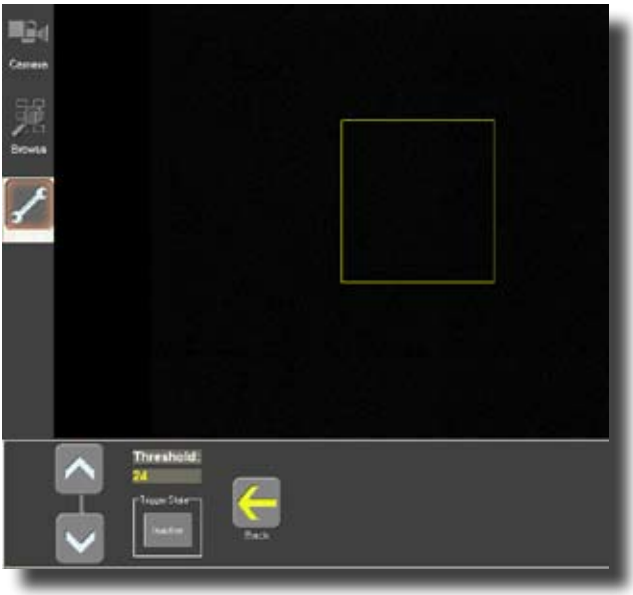
Specifying pre-trigger and post-trigger times



Record whole trigger: If you select this point, recording is done as long as the trigger is active.

Image trigger (ROI)

4. **ROI**: In this context you can set the threshold for the brightness of the image trigger (0-100%), as well as define the range, which should be controlled. You need only to pull up the area with the mouse or with the touchpad (yellow rectangle). If the brightness in this active area (ROI) changes now, and exceeds the set threshold value, the trigger is activated.



5. **Back**: Using this key, control is transferred up one menu level.

Playing back recordings

Playing back recordings

If you load a recording from the browser or using *Play Last* for playback, this is presented in a new context. Basically with this presentation the time line (time axis) is displayed below the video, as can be recognized in video extract programmes.

Timeline

1. ***The Timeline*** displays an overview of the whole recording in small individual images. With the finger or mouse, you can quickly go through the recording by “browsing“ through the time-line, to find interesting scenes quickly.

Timeline-Spiltter (Zoom)

2. With the **Splitter-Key** you can zoom in to the current position of the playback arrow in the timeline or expand these in time. This is very helpful in looking for an event in long recodings.

Play/Pause Key

3. With the ***Play/Pause Key*** you can start and pause a playback. The playback is done with the image rate setting in Setup/Playframes.

Zoom-Key

4. With the ***Zoom-Key*** you can zoom in on the recording. The image is then magnified by a factor of two. You can now scroll the image within the window with the mouse or by using the finger.

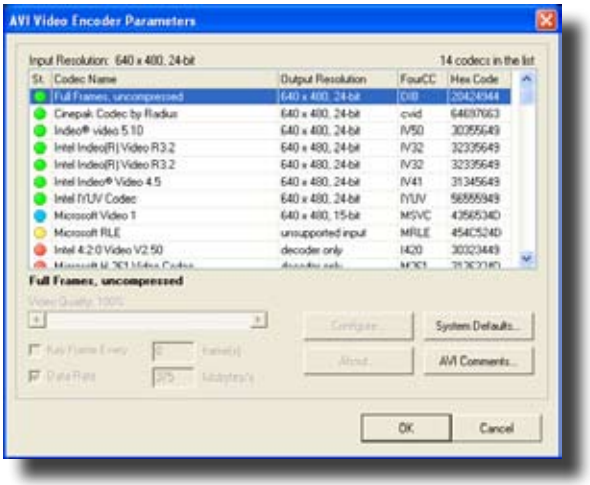
Save sequence

5. Using the ***Save-Key*** you call up the dialogue of a sequence to be played (saved). In this dialogue you can decide, if you wish to save the recordings as AVI or image sequences in different formats (bmp, jpeg, etc.). The sequence is saved according to the positions of the In and Out Marking (10) and (11).

CODEC

If you choose the AVI media format, then another dialogue is displayed to you, wherein you can decide the CODEC (compression algorithm) that you wish to use. A procedure or programme is described as Codec, if it codes, decodes and/or compresses data or signals digitally. According to the quality of the Codec and the compression settings, visible image quality losses may be observed.

Known Codecs are Indeo 5.1 and MPEG-2, for example. We recommend that you try out several Codecs, in order to find the ideal one for your application.



You will thus find out which Codec produces the desired highest allowed image quality or the file size. Please consider that while playing a compressed video file on the target computer (PC or Laptop) the Codec should also be installed. It may happen, that only certain Codecs are accessible or allowed by you or the recipient of the video files. Subsequently, of course, other Codecs may be installed. These then appear in the selection list, but only if they are AVI compatible. For example, the Quicktime Codec does not appear, since it does not support the AVI format. To create files please click on the button *Render*. The output path can be selected with „Select Target Base Directory“.

To Batch (batch file)

6. To **Batch:** If you do not wish to render out recordings immediately, but at a later time (e.g., during the night), you can store the desired sequences in a batch (batch file). You can initiate the batch from the browser.

Back (Single image backwards)

7. **Back** key. With this key you can move back in the single image mode.

Forward (Single image forwards)

8. **Forward** key: With this key you can move forward in the single image mode.

Jump-To: Jump to time

9. **Jump-To** key: With this key you can call a dialogue to jump to a defined time in the timeline. Indicate the desired time, for this purpose:

In-Marker

10. The ***In-Marker*** marks the starting point of a sequence to be played. If you click on this key, the current position of the cursor in the timeline is taken as the starting point (green arrow in the timeline).

Out-Marker

11. The ***Out-Marker*** marks the ending point of a sequence to be played. If you click on this key, the current position of the cursor in the timeline is taken as the ending point (red arrow in the timeline).

Create preview image

12. You can determine which image is used in the browser as a preview image with the ***Thumbnail key*** If the recordings are very similar, or begin with a relatively insignificant image, then an image, which will enable faster classification, can be selected using this function. The image, which is currently in the sight, is used as new thumbnail whenever you press the key.

Call time markings

13. In the opening box for ***Markers*** you will find all created time markers of a listed recording. If you select one of these markers, the playback jumps to the corresponding position. To get these time markings, you should have selected the corresponding recording in the Trigger

Setup UseTrigger for setting Markers.

Time markers

4 Troubleshooting

VGA Monitor

Problem: The marathon 200 LT system starts up, but no image can be seen on the connected monitor.

Solution: To resolve the problem, the key combination ***Ctrl+Alt+F1*** should be clicked on a connected USB keyboard after a successful Windows Start.

Cause: The device has no physical defect, only the VGA output is deactivated. This is a known problem for all Intel laptop chip sets and is encountered if the computer starts without a connected VGA Monitor. Unfortunately, Intel has not yet resolved this known problem.

Software

Problem: Just after booting the system the software displays the error message “Drop frames“, after starting the first recording.

Solution: Please wait for 1-2 minutes and try the recording once again.

Cause: The operating system has not yet started up all services and blocks necessary system resources.

5 Service and guarantee

Guarantee conditions:

Non-observance by the user of the safety measures and important directions releases gsvitec GmbH from its guarantee obligations.
Parts, which are exposed to an exceptional rate of wear and tear due to their limited lifespan, are excluded from the guarantee, over and above the legal stipulations. If the device is used in conditions not in keeping with specifications or in conditions not stipulated for use, there is no entitlement to a guarantee.
If service intervals are stipulated, these need to be unconditionally maintained.

Transport damage

Considerable exposures to shock are encountered during transportation of the devices, which could damage or destroy parts or components. Our original packing guarantees secure transportation of our devices, while maintaining general transportation specifications.
Please use our original packing for supplementary transportation or return of consignment. In any other case, we will not be able to assume any guarantee for damages due to transportation. If damages do occur, however, these should be informed immediately. Visible external damage to the external packaging needs to be informed without fail to the dispatcher or to the courrier organisation, while picking up the device.

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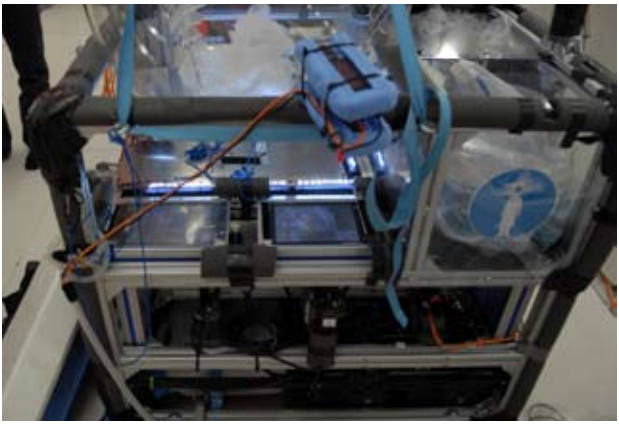
6 Customer application

marathon 200 LT in zero gravity

10. parabolic flight campaign of the DLR with four marathon 200 LT systems on board.

CCS - Cloud Core Scanner - an artistic experiment in zero gravity. On occasion of the tenth parabolic flight campaign of the DLR (German Aerospace Center), Agnes Meyer-Brandis is venturing an expedition into 8500m altitude, in order to research the activities of aerosols under the condition of zero-gravity (Sept. 2007).
On board and being activated for the very first time are the “Cloud-Core Scanner” (CCS) and the new “ADM-Filmbox”, able to capture even the fastest among the tiniest.
The CCS is the first picture generating instrument for examining the smallest particles in the clouds’ interior – the cloud cores, so-called aerosols. The hovering water accumulations and its nucleus will be explored inside the laboratory „CCS-Flight-Sphere.
The ADM-Filmbox - animation by microgravity, is one apparatus for the creation and generation of (moving- and still-)images with scientific methods and artistic vision.

Within the ADM-Filmbox four marathon 200 LT Highspeedcamera-recording units were installed. Even in these very difficult lighting and operating conditions at high (>2G) and zero G all units worked very well. Because of the very high sensitivity and dynamic range of the cameras it was possible to install the experiment in a very small place without large and complex lighting systems - but with a high quality image as result.



ADM-Filmbox equipped with four marathon 200 LT high-speed camera systems

DLR - Airbus A300 „ZERO-G“

MARATHON 200 LT

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